

ABSTRACT OF THE DISCLOSURE

A matrix coil for generating a variable magnetic field is provided, including a plurality of loops arranged in a series so as to have a substantially common axis and segmented into at least one arc-shaped segment, a variable current source for each of the arc-shaped segments, and a controller. The controller is configured to selectively vary an amount of current provided to each of the arc-shaped segments by the variable current sources so as to achieve a variable base field, one or more variable gradient fields, and one or more variable second order shim fields.